(19)日本国特許庁（ＪＰ）　(12) **公開特許公報**（Ａ）　(11)特許出願公開番号

特開平9－192659

(43)公開日　平成９年(1997)７月29日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ		技術表示箇所
Ｃ０２Ｆ　1/32			Ｃ０２Ｆ　1/32		
Ｂ０１Ｊ　21/06			Ｂ０１Ｊ　21/06	Ｍ	
35/02			35/02	Ｊ	
Ｃ０２Ｆ　1/42			Ｃ０２Ｆ　1/42	Ａ	

審査請求　有　　請求項の数７　ＯＬ　（全　４　頁）

(21)出願番号　特願平8－9918

(22)出願日　平成８年(1996)１月24日

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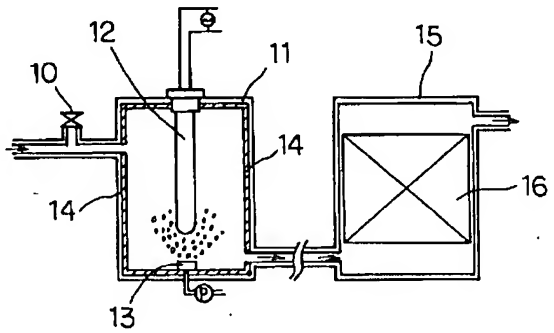
(54)【発明の名称】　紫外線酸化装置

(57)【要約】
【課題】　超純水の製造の最終段階で用いるＵＶ酸化装置のランニングコストを低減する。
【解決手段】　ＵＶ酸化装置のＵＶ処理槽内壁に光酸化触媒を保持させる。



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【特許請求の範囲】

【請求項１】　被処理水に紫外線を照射する領域を構成する紫外線処理槽を有し、純水から超純水を得る工程での純水中の有機物の紫外線酸化処理に用いる紫外線酸化装置において、

前記紫外線処理槽内壁に、紫外線による前記有機物の酸化を触媒する光酸化触媒を保持させたことを特徴とする紫外線酸化装置。

【請求項２】　前記紫外線酸化処理槽が、長管状の紫外線ランプと、該長管状の紫外線ランプの長手方向の中心軸と同軸をなす円筒形状部分とを有し、少なくとも該円筒形状部分の周側面内壁に前記光酸化触媒が保持されている請求項１に記載の紫外線酸化装置。

【請求項３】　前記円筒状部分の周側面内壁に凹凸を設けた請求項２に記載の紫外線酸化装置。

【請求項４】　前記光酸化触媒が、TiO_2である請求項１～３のいずれかに記載の紫外線酸化装置。

【請求項５】　前記光酸化触媒が、前記紫外線処理槽内壁上に形成した被膜中に含まれる請求項１～４のいずれかに記載の紫外線酸化装置。

【請求項６】　前記光酸化触媒が、前記紫外線処理槽内壁上に被膜を形成している請求項１～５のいずれかに記載の紫外線酸化装置。

【請求項７】　請求項１～６のいずれかに記載の紫外線酸化装置と、該紫外線酸化装置から供給される処理水をイオン交換処理して超純水を得るためのイオン交換装置とを有することを特徴とする純水からの有機物除去装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、超純水の製造工程において、純水中に含まれる有機物の紫外線酸化処理に用いる紫外線酸化装置に関する。

【０００２】

【従来の技術】半導体製造工業等において、洗浄水等の用途に有機物、各種イオン等の不純物を極めて低いレベルにまで低下させた純水の利用が盛んになってきており、純水を更に高純度化した超純水も利用されるに至っている。

【０００３】超純水の製造工程においては、ｐｐｂレベルの全有機炭素（ＴＯＣ）での有機物の混入までも問題視されるようになってきており、近年微量有機分の除去方法についての種々の検討がなされ、その結果として、紫外線（ＵＶ）酸化処理を利用した有機物の分解除去工程が盛んに導入されている。

【０００４】純水の製造装置は一般的にはイオン交換装置を主体として構成されており、ｐｐｂレベルでの有機物の除去効果は期待できない。そこで、イオン交換装置での各種イオンを除去して得られる純水中に含まれる有機物に、紫外線を照射してこれを酸化分解し、$COOH^-$、$H_2CO_3^-$等の陰イオンに変化させる工程を紫外線（ＵＶ）酸化装置によって行い、この紫外線酸化処理によって生じたイオンを後段に設けたイオン交換装置で除去することでＴＯＣのｐｐｂレベルまでの低下を実現する方法が注目されている。

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【０００５】ＵＶ酸化装置自体の構造は、図３に示すとおりで、ステンレス製のＵＶ処理層３１の中に管状の高圧紫外線（ＵＶ）ランプ３２が設置されており、被処理水中の微量有機物がＵＶ照射により分解される。また、その酸化分解を促進する目的で、被処理水中には槽の前段の過酸化水素注入口３０から過酸化水素が混合され、さらには、槽内に設けたエアバブラ３３からエアまたはオゾンが槽内の被処理水中にバブリングされる。

【０００６】ＵＶ酸化装置内で処理された水は、処理槽３１の後段に設置されたイオン交換装置３４に送り込まれ、有機物の酸化分解で生じた陰イオンがイオン交換樹脂３５によって除去される。

【０００７】

【発明が解決しようとする課題】上述したＵＶ酸化装置における紫外線照射手段としての紫外線（ＵＶ）ランプとしては、通常、高圧ＵＶランプが使われている。しかし、高圧ＵＶランプを用いた酸化処理では、

ａ）高圧ＵＶランプの消費電力が大きい、

ｂ）高圧ＵＶランプには寿命があり、定期的な交換が必要であるにも拘らず単価が高い、

ｃ）高圧ＵＶランプによる紫外線照射での酸化効果を十分なものにするためには過酸化水素の混合や、エアやオゾンのバブリングが必要である、等の理由によってランニングコストが高いという問題があった。

【０００８】本発明はかかる従来技術における問題に鑑みなされたものであり、その目的はランニングコストの低減を可能とするＵＶ酸化装置を提供することにある。

【０００９】

【課題を解決するための手段】上記目的を達成し得る本発明の紫外線（ＵＶ）酸化装置は、被処理水に紫外線を照射する領域を構成する紫外線処理槽を有し、純水から超純水を得る工程での純水中の有機物の紫外線酸化処理に用いる紫外線酸化装置において、前記紫外線処理槽内壁に、紫外線による前記有機物の酸化を触媒する光酸化触媒を保持させたことを特徴とする。

【００１０】ＵＶ処理槽内壁に光酸化触媒を保持させたことで、ＵＶランプの近傍だけでなくＵＶ処理槽内壁表面においても有機物のＵＶ酸化が効率的に行われ、被処理水としての微量有機物を含む純水の単位処理流量当りのＵＶランプの出力を低減させたり、前段で混合する過酸化水素の量や被処理水にバブリングするエアやオゾンの量を低減させることが可能となる。また、同一照射条件において、光酸化触媒をＵＶ処理槽内壁に保持させない場合と比べて、本発明のＵＶ酸化装置では酸化処理時間を短縮したり、ＵＶ処理槽の容積を拡大でき、単位時

間当りの処理量を増大させることが可能となる。その結果、ＵＶ酸化処理におけるランニングコストの総合的な低減が可能となる。

【００１１】

【発明の実施の形態】光酸化触媒としては、例えばTiO_2等を挙げることができる。ＵＶ処理槽内壁への光酸化触媒の保持は、光酸化触媒自体が吸着性のものであれば、それを適当な方法で処理槽内壁に吸着させて行うことができる。また、光酸化触媒がそれ自身吸着性を有さない場合でも、本発明の効果を損なわない範囲内で、吸着性を有する適当な担体やバインダーと混合して処理槽内壁への保持を達成できる。バインダーとしては、例えばポリテトラフルオロエチレン（例えばデュポン社の商品名：テフロン）等を用いることができる。光酸化触媒のＵＶ処理槽内壁への保持には、例えば、適当な溶媒に、光酸化触媒を、必要に応じてバインダーと共に分散あるいは溶解させた塗布用液を調製し、これをＵＶ処理槽内壁の所定の位置に塗布して乾燥等の処理によって被膜化させる方法などが利用できる。

【００１２】ＵＶ処理槽内壁への光酸化触媒の保持においては、光酸化触媒が関与する酸化反応がＵＶ処理装置内の広範にわたって生じる、すなわち、被処理水と光酸化触媒との接触面積ができる限り広くなる位置に保持させることが好ましい。更に、ＵＶ処理槽の構造自体をその内壁面積が、ＵＶランプと内壁との距離が必要以上に遠くならない範囲内で最大となるようにすることで、より効率良い酸化処理を達成することができる。

【００１３】本発明のＵＶ酸化装置での処理は、有機物を含む純水からの有機物の除去工程に好適に利用でき、なかでも、純水のＴＯＣをｐｐｂレベルにまで低下させるための処理に特に好適である。処理する純水のグレードとしては、例えばＡＳＴＭＤ　５１２７－９０で規定されているＴｙｐｅ　Ｅ－１レベルの超純水での純度向上に有効である。

【００１４】

【実施例】以下、実施例により本発明を更に詳細に説明する。

実施例１

図１は、本発明の第１の実施例の概要をイオン交換装置との接続状態において示す図である。このＵＶ酸化装置は、過酸化水素注入口１０、ステンレス等の材料で構成されたＵＶ処理槽１１、高圧ＵＶランプ１２、エアバブラ１３及びTiO_2膜１４を有して構成されている。過酸化水素注入口にはバルブが設置されており、被処理水に混合される過酸化水素の供給量が調節できるようになっている。エアバブラ１３はポンプ等を有する気体供給手段と接続されており、ここからエア（空気）やオゾン等の酸化処理を促進可能な気体を、所定の圧力及び通気量で被処理水中へバブリング可能となっている。

【００１５】ＵＶ処理槽１１は、長管状の高圧ＵＶランプの中心軸と同軸をなす、すなわち周側面内壁の各点がＵＶランプと等距離をなす円筒状の形状を有する。高圧ＵＶランプとＵＶ処理槽の円筒状部分における周側面内壁との距離は、TiO_2膜による光酸化触媒作用が効果的に得られる距離とされ、ＵＶランプの照射強度、被処理水中の有機物量等に応じて設定される。

【００１６】この装置では、酸化槽内壁全面にTiO_2膜を設けたことで、酸化槽内壁に設けられたTiO_2膜上でも光酸化が行われ、TiO_2膜がない場合に比べてより効率的な光酸化処理が可能となる。その結果、TiO_2膜を設けない場合に比較して、処理時間の短縮、過酸化水素やバブリングの量の低減、ＵＶランプ出力の低減あるいは酸化槽容積の拡大などを図ることができ、ランニングコストの効果的な低減が可能となる。

【００１７】ＵＶ処理槽の内壁に設けられたTiO_2膜は、塗布法により形成されたものである。

【００１８】この装置におけるＵＶ酸化処理は、例えば、過酸化水素注入口１０のバルブを開放して、過酸化水素溶液の所定量を注入しつつＵＶ処理槽１１内にイオン交換処理等によって得た微量の有機物を含む純水を充填し、ポンプを作動してエアバブラ１３からエアまたはオゾンを所定の通気量でバブリングしながらＵＶランプ１２からＵＶ照射することによって行うことができる。

【００１９】この酸化処理は、所定の処理時間経過後に処理済みの純水の全量を後段のイオン交換工程へ移行させるバッチ式、槽内への被処理水の供給と処理済み水の排出を所定の滞留時間が得られるように調節して連続的に行う連続式などの種々の制御方式で行うことができる。

【００２０】ＵＶ酸化処理された純水は、後段のイオン交換装置３４に送られ、ＵＶ酸化で有機物から生じた陰イオンが陰イオン交換樹脂３５によって除去され、ｐｐｂレベルまでＴＯＣが低下した超純水を得ることができる。

【００２１】実施例２

図２は本発明の第２の実施例の概要をイオン交換装置との接続状態において示す図である。このＵＶ酸化装置は、基本的には図１で示した装置と同じ構成を有するが、ＵＶ処理槽２１の円筒状部分の周側面の内壁部分に凹凸を設けることで、被処理水とTiO_2膜との接触面積をより大きくして、更に効果的な酸化処理を可能としたものである。

【００２２】図２の例では、円筒形状部分の軸方向における断面が波形となるようにその周側面を成型したものが利用されているが、この凹凸形状はこれに限定されず、例えば、円筒状部分の中心軸に垂直な断面において波形を形成するものであってもよい。更に、凹凸の形状自身も、凸部の頂部や凹部の底部が曲面を構成するものや、角部からなるものなど種々の形状とすることができる。加工性等を考慮した場合は、図２に示すような断面

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が波形のものが好ましい。

【００２３】凹凸を設ける場合のこれらの間隔あるいは凹部と凸部との高低差は、高圧ＵＶランプとの距離が最大となる位置において所望の光酸化触媒効果が得られ、しかもＴｉO_2膜と被処理水との接触面積を最大にすることができるものが好ましい。このように、ＵＶ処理槽の内壁面に凹凸を設けたことにより、ＴｉO_2膜の表面積をより大きく、すなわち被処理水とＴｉO_2膜との接触面積をより大きくして、酸化処理効率を更に上昇させることができる。

【００２４】

【発明の効果】以上説明したように、本発明のＵＶ酸化装置によれば、ＵＶ処理槽内壁面に光酸化触媒を保持させたことにより、光酸化反応をＵＶランプ近傍だけでなくＵＶ処理槽内壁面上でも盛んに進行させることができ、従来法に比較し、単位流量当りのＵＶランプの出力を減少させることができ、更には酸化促進のために前段で混合される過酸化水素量及びエアもしくはオゾンのバブリング量を減少させることが可能となる。また、同一出力のＵＶランプを用いた場合にはＵＶ処理槽の容積をより大きくしたり、処理時間を短縮することで単位時間当りの処理量を増加させることができる。その結果、ＵＶ酸化処理で問題となっているランニングコストの総合的な低減を図ることができる。

【図面の簡単な説明】

【図１】本発明の第１の実施例の概要を示す断面図である。

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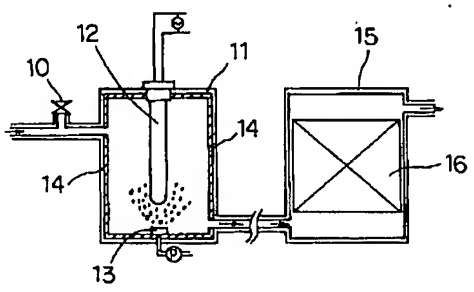
【図２】本発明の第２の実施例の概要を示す断面図である。

【図３】従来におけるＵＶ酸化装置の概要を示す断面図である。

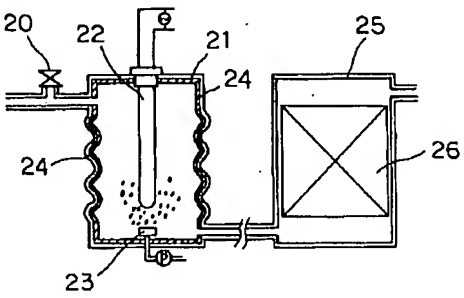
【符号の説明】

１０	過酸化水素注入口
１１	ＵＶ処理槽
１２	高圧ＵＶランプ
１３	エアバブラ
１４	ＴｉO_2膜
１５	イオン交換装置
１６	イオン交換樹脂
２０	過酸化水素注入口
２１	ＵＶ処理槽
２２	高圧ＵＶランプ
２３	エアバブラ
２４	ＴｉO_2膜
２５	イオン交換装置
２６	イオン交換樹脂
３０	過酸化水素注入口
３１	ＵＶ処理槽
３２	高圧ＵＶランプ
３３	エアバブラ
３４	イオン交換装置
３５	イオン交換樹脂

【図１】



【図２】



【図３】

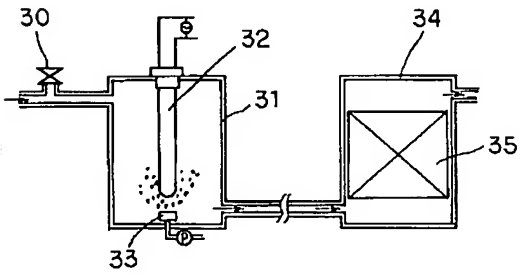


Fig.

PRIOR ART

[Description of the Prior Art] In the semi-conductor manufacturing industry etc., use of the pure water which reduced impurities, such as the organic substance and various ion, for the application of wash water etc. even at very low level prospers, and the ultrapure water which high-grade-ized pure water further has also come to be used.

[0003] In the production process of ultrapure water, it is regarded as questionable to mixing of the organic substance in the total organic carbon (TOC) of ppb level, the various examination about the removal approach for minute amount organic is made in recent years, and the decomposition removal process of the organic substance of having used ultraviolet-rays (UV) oxidation treatment is briskly introduced as the result.

[0004] Generally the manufacturing installation of pure water is constituted considering the ion exchange equipment as a subject, and the removal effectiveness of the organic substance in ppb level cannot be expected. Then, an ultraviolet-rays (UV) oxidation system performs the process which ultraviolet rays are irradiated [process], and oxidative degradation of this is carried out [process] to the organic substance contained in the pure water which removes the various ion in an ion exchange unit, and is obtained, and changes it to anions, such as COOH- and H2CO3-, and the approach of realizing the fall to the ppb level of TOC by removing the ion produced by this ultraviolet-rays oxidation treatment with the ion exchange unit formed in the latter part attracts attention.

[0005] The structure of the UV oxidation system itself is as being shown in drawing 3 , the tubing-like high-pressure ultraviolet-rays (UV) lamp 32 is installed into UV processing layer 31 made from stainless steel, and the processed underwater minute amount organic substance is disassembled by UV irradiation. Moreover, a hydrogen peroxide is mixed by processed underwater one from the hydrogen-peroxide inlet 30 of the preceding paragraph of a tub, and bubbling of air or the ozone is further carried out to the processed underwater one in a tub from the air bubbler 33 prepared in the tub in order to promote the oxidative degradation.

[0006] The water processed within UV oxidation system is sent into the ion exchange unit 34 installed in the latter part of the processing tub 31, and the anion produced in the oxidative degradation of the organic substance is removed by ion exchange resin 35.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the ultraviolet ray oxidation equipment used for ultraviolet-rays oxidation treatment of the organic substance contained in pure water in the production process of ultrapure water.
[0002]
[Description of the Prior Art] In the semi-conductor manufacturing industry etc., use of the pure water which reduced impurities, such as the organic substance and various ion, for the application of wash water etc. even at very low level prospers, and the ultrapure water which high-grade-ized pure water further has also come to be used.
[0003] In the production process of ultrapure water, it is regarded as questionable to mixing of the organic substance in the total organic carbon (TOC) of ppb level, the various examination about the removal approach for minute amount organic is made in recent years, and the decomposition removal process of the organic substance of having used ultraviolet-rays (UV) oxidation treatment is briskly introduced as the result.
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[0006] The water processed within UV oxidation system is sent into the ion exchange unit 34 installed in the latter part of the processing tub 31, and the anion produced in the oxidative degradation of the organic substance is removed by ion exchange resin 35.
[0007]
[Problem(s) to be Solved by the Invention] As an ultraviolet-rays (UV) lamp as a UV irradiation means in UV oxidation system mentioned above, the high-pressure UV lamp is usually used. However, in oxidation treatment using a high-pressure UV lamp, there was a life in a b high-pressure UV lamp with the large power consumption of an a high-pressure UV lamp, and there was a problem that a running cost was high, according to the reason of ** BAPURINGU of mixing of a hydrogen peroxide, air, or ozone is required in order to make the oxidization effectiveness in UV irradiation with a c high-pressure UV lamp with a high unit price into sufficient thing, although periodical exchange is required.
[0008] This invention is made in view of the problem in this conventional technique, and the purpose is in offering UV oxidation system which enables reduction of a running cost.
[0009]
[Means for Solving the Problem] The ultraviolet-rays (UV) oxidation system of this invention which can attain the above-mentioned purpose has the ultraviolet treatment tub which constitutes the field which irradiates ultraviolet rays in processed water, and is characterized by making the photooxidation catalyst which carries out the catalyst of the oxidation of said organic substance by ultraviolet rays to said

ultraviolet treatment inner wall of tank hold in the ultraviolet ray oxidation equipment used for ultraviolet-rays oxidation treatment of the organic substance in the pure water in the process which obtains ultrapure water from pure water.

[0010] by having make the photooxidation catalyst hold to UV processing inner wall of tank , also not only near the UV lamp but in UV processing inner wall of tank front face , UV oxidation of the organic substance be perform efficiently , and the output of UV lamp per unit processing flow rate of the pure water containing the minute amount organic substance as processed water be reduce , or it become possible to reduce the amount of the air which carry out bubbling to the amount and processed water of the hydrogen peroxide mix in the preceding paragraph , or ozone . Moreover, in the same exposure conditions, compared with the case where a photooxidation catalyst is not made to hold to UV processing inner wall of tank, oxidation-treatment time amount can be shortened, or the volume of UV processing tub can be expanded, and it becomes possible with UV oxidation system of this invention to increase the throughput per unit time amount. Consequently, synthetic reduction of the running cost in UV oxidation treatment is attained.

[0011]

[Embodiment of the Invention] As a photooxidation catalyst, TiO2 grade can be mentioned, for example. Maintenance of the photooxidation catalyst to UV processing inner wall of tank can be performed by making it stick to a processing inner wall of tank by the suitable approach, if the photooxidation catalyst itself is an adsorbent thing. Moreover, even when a photooxidation catalyst does not have adsorbent in itself, within limits which do not spoil the effectiveness of this invention, it mixes with the suitable support and the suitable binder which have adsorbent, and the maintenance to a processing inner wall of tank can be attained. As a binder, polytetrafluoroethylene (for example, the trade name of Du Pont: Teflon) etc. can be used, for example. The liquid for spreading which accepted the need and was made to distribute or dissolve a photooxidation catalyst in a suitable solvent with a binder for example, is prepared in maintenance to UV processing inner wall of tank of a photooxidation catalyst, and the approach of applying this to the position of UV processing inner wall of tank, and making it coat-ize by processing of desiccation etc. can be used for it.

[0012] In maintenance of the photooxidation catalyst to UV processing inner wall of tank, it is desirable for the oxidation reaction in which a photooxidation catalyst participates to cross extensively in UV processor, and for it to be generated, namely, to make it hold in the location where the touch area of processed water and a photooxidation catalyst becomes as large as possible. Furthermore, more efficient oxidation treatment can be attained by making it become max within limits which the internal-surface product does not have in the structure of UV processing tub itself if the distance of UV lamp and a wall is a long distance beyond the need.

[0013] Processing with UV oxidation system of this invention is suitable for especially the processing for being able to use suitable for the removal process of the organic substance from the pure water containing the organic substance, and reducing TOC of pure water even on ppb level especially. As grade of the pure water to process, it is ASTMD, for example. Type specified by 5127-90 It is effective in the improvement in purity with the ultrapure water of E-1 level.

[0014]

[Example] Hereafter, an example explains this invention to a detail further.

Example 1 drawing 1 is drawing showing the outline of the 1st example of this invention in a connection condition with an ion exchange unit. This UV oxidation system has UV processing tub 11 which consisted of ingredients, such as the hydrogen-peroxide inlet 10 and stainless steel, the high-pressure UV lamp 12, the air bubbler 13, and TiO2 film 14, and is constituted. The bulb is installed in the hydrogen-peroxide inlet and the amount of supply of the hydrogen peroxide mixed by processed water can be adjusted now. It connects with a gas supply means to have a pump etc., and bubbling is possible for the air bubbler 13 to processed underwater one in the gas which can promote oxidation treatment of air (air), ozone, etc. from here at a predetermined pressure and the predetermined quantity of airflow.

[0015] UV processing tub 11 makes long tubing-like the medial axis and the same axle of a high-pressure UV lamp, namely, has the cylinder-like configuration where each point of a circumferential

side-face wall makes UV lamp and the equal distance. The photooxidation catalysis by TiO2 film is made into the distance acquired effectively, and the distance of a high-pressure UV lamp and the circumferential side-face wall in the cylindrical part of UV processing tub is set up according to the exposure reinforcement of UV lamp, the processed underwater amount of organic substance, etc.
[0016] With this equipment, also on the TiO2 film prepared in the oxidation inner wall of tank, photooxidation is performed and more efficient photooxidation processing is attained compared with the case where there is no TiO2 film, by having prepared TiO2 film all over the oxidation inner wall of tank. Consequently, as compared with the case where TiO2 film is not prepared, compaction of the processing time, reduction of the amount of a hydrogen peroxide or bubbling, reduction of UV lamp output, or expansion of the oxidation tub volume can be aimed at, and effective reduction of a running cost is attained.
[0017] TiO2 film prepared in the wall of UV processing tub is formed by the applying method.
[0018] UV oxidation treatment in this equipment can be performed by carrying out UV irradiation from the UV lamp 12, being filled up with the pure water containing the organic substance of the minute amount obtained by ion exchange treatment etc. in UV processing tub 11, operating a pump, and carrying out bubbling of air or the ozone with the predetermined quantity of airflow from the air bubbler 13 opening the bulb of the hydrogen-peroxide inlet 10 wide, and pouring in the specified quantity of a hydrogen-peroxide solution.
[0019] Various control systems, such as a batch type which makes the whole quantity of pure water [finishing / processing] shift to a latter ion-exchange process after predetermined processing-time progress, and continuous system which adjusts supply of the processed water into a tub and discharge of processed water so that the predetermined residence time may be acquired, and performs them continuously, can perform this oxidation treatment.
[0020] The pure water by which UV oxidation treatment was carried out is sent to the latter ion exchange unit 34, the anion produced from the organic substance in UV oxidization is removed by the anion exchange resin 35, and the ultrapure water with which TOC fell to ppb level can be obtained.
[0021] Example 2 drawing 2 is drawing showing the outline of the 2nd example of this invention in a connection condition with an ion exchange unit. Fundamentally, although it has the same configuration as the equipment shown by drawing 1 , this UV oxidation system is preparing irregularity in the wall part of the circumferential side face of the cylindrical part of UV processing tub 21, enlarges the touch area of processed water and TiO2 film more, and makes still more effective oxidation treatment possible.
[0022] Although what cast that circumferential side face is used in the example of drawing 2 so that the cross section in the shaft orientations of a cylindrical shape-like part may serve as a wave, the shape of this toothing is not limited to this, for example, may form a wave in a cross section perpendicular to the medial axis of a cylindrical part. Furthermore, the concavo-convex configuration itself can be made into various configurations, such as that from which the crowning of heights and the pars basilaris ossis occipitalis of a crevice constitute a curved surface, and a thing which consists of a corner. When workability etc. is taken into consideration, the thing of a wave [cross section / as shown in drawing 2] is desirable.
[0023] As for the difference of elevation of these spacing or crevices, and heights in the case of preparing irregularity, what the desired photooxidation catalyst effectiveness is acquired in the location where distance with a high-pressure UV lamp serves as max, and can moreover make max the touch area of TiO2 film and processed water is desirable. Thus, by having prepared irregularity in the internal surface of UV processing tub, it can be more large in the surface area of TiO2 film, namely, the touch area of processed water and TiO2 film can be enlarged more, and oxidation-treatment effectiveness can be raised further.
[0024]
[Effect of the Invention] As explained above, according to the UV oxidation system of this invention, by having made the photooxidation catalyst hold to UV processing inner-wall-of-tank side A photooxidation reaction can be briskly advanced also not only near the UV lamp but on UV processing

inner-wall-of-tank side. It becomes possible to be able to decrease the output of UV lamp per unit flow rate, and to decrease the amount of hydrogen peroxides further mixed in the preceding paragraph for promotion of oxidization and air, or the amount of bubbling of ozone as compared with a conventional method. Moreover, when UV lamp of the same output is used, the volume of UV processing tub can be enlarged more, or the throughput per unit time amount can be made to increase by shortening the processing time. Consequently, synthetic reduction of a running cost which poses a problem by UV oxidation treatment can be aimed at.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] Ultraviolet ray oxidation equipment characterized by making the photooxidation catalyst which carries out the catalyst of the oxidation of said organic substance by ultraviolet rays to said ultraviolet treatment inner wall of tank hold in the ultraviolet ray oxidation equipment used for ultraviolet-rays oxidation treatment of the organic substance in the pure water in the process which has the ultraviolet treatment tub which constitutes the field which irradiates ultraviolet rays in processed water, and obtains ultrapure water from pure water.
[Claim 2] Ultraviolet ray oxidation equipment according to claim 1 with which said ultraviolet-rays oxidation-treatment tub has the cylindrical shape-like part which makes the medial axis and the same axle of a longitudinal direction of a long tubing-like ultraviolet ray lamp and the ultraviolet ray lamp of the shape of this long tubing, and said photooxidation catalyst is held at least at the circumferential side-face wall of this cylindrical shape-like part.
[Claim 3] Ultraviolet ray oxidation equipment according to claim 2 which prepared irregularity in the circumferential side-face wall of said cylindrical part.
[Claim 4] Ultraviolet ray oxidation equipment according to claim 1 to 3 said whose photooxidation catalyst is TiO2.
[Claim 5] Ultraviolet ray oxidation equipment according to claim 1 to 4 contained in the coat which said photooxidation catalyst formed on said ultraviolet treatment inner wall of tank.
[Claim 6] Ultraviolet ray oxidation equipment according to claim 1 to 5 with which said photooxidation catalyst forms the coat on said ultraviolet treatment inner wall of tank.
[Claim 7] The organic substance stripper from the pure water characterized by having ultraviolet ray oxidation equipment according to claim 1 to 6 and an ion exchange unit for carrying out ion exchange treatment of the treated water supplied from this ultraviolet ray oxidation equipment, and obtaining ultrapure water.

[Translation done.]